

1 **All Pending Claims:**

2 **(in Clear Form, in accordance with 37 CFR §1.121):**

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4
5 Please amend claims 1, 12-15, 17-20, 22, 24, 25, 33, 36, 37, 40, and 41 as
6 indicated below.
7

8
9 **1. (THRICE AMENDED)** An audio watermarking system comprising
10 a pattern generator configured to generate both a strong watermark and a
11 weak watermark; and

12 a watermark insertion unit configured to selectively insert either the strong
13 watermark or the weak watermark into segments of the audio signal, so that
14 resulting segments have either the strong or the weak watermark inserted therein,
15 but not both.

16
17 **2. (PREVIOUSLY TWICE AMENDED)** An audio watermarking
18 system comprising:

19 a pattern generator to generate both a strong watermark and a weak
20 watermark; and

21 a watermark insertion unit to insert the strong watermark and the weak
22 watermark into the audio signal,

23 wherein the watermark insertion unit selectively inserts either the strong
24 watermark or the weak watermark into segments of the signal according to an
25 audible measure of the segments.

1
2 **3. (PREVIOUSLY TWICE AMENDED)** An audio watermarking

3 system comprising:

4 a pattern generator to generate both a strong watermark and a weak
5 watermark;

6 a watermark insertion unit to insert the strong watermark and the weak
7 watermark into the audio signal;

8 a processor to determine a hearing threshold for the audio signal; and

9 the watermark insertion unit inserts the strong watermark when the signal
10 exceeds the hearing threshold and inserts the weak watermark when the signal
11 falls below the hearing threshold.

12
13 **4.** An operating system comprising an audio watermarking system as
14 recited in claim 1.

15
16 **5. (PREVIOUSLY AMENDED)** An audio watermark encoding
17 system comprising:

18 a converter to convert an audio signal into magnitude and phase
19 components;

20 a mask processor to determine a hearing threshold for corresponding
21 magnitude components;

22 a pattern generator to generate both a strong watermark and a weak
23 watermark; and
24
25

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1 a watermark insertion unit to selectively insert one of either the strong
2 watermark or the weak watermark into the audio signal based on whether the
3 magnitude components exceed or fall below the hearing threshold.

4
5 6. An audio watermark encoding system as recited in claim 5, wherein
6 the watermark insertion unit inserts the strong watermark when the magnitude
7 component exceeds the hearing threshold and inserts the weak watermark when
8 the magnitude component falls below the hearing threshold.

9
10 7. An audio watermark encoding system as recited in claim 5, wherein
11 the watermark insertion unit inserts the strong watermark when the magnitude
12 component exceeds the hearing threshold by a predetermined amount and inserts
13 the weak watermark when the magnitude component falls below the hearing
14 threshold by the predetermined amount.

15
16 8. An audio watermark encoding system as recited in claim 7, wherein
17 the watermark insertion unit foregoes inserting the strong watermark or the weak
18 watermark when the magnitude component lies within the predetermined amount
19 above and below the hearing threshold.

20
21 9. An audio encoding system comprising:
22 an audio watermark encoding system as recited in claim 5; and
23 a compression unit, wherein the compression unit and the audio watermark
24 encoding system both utilize the magnitude components.
25

1 10. An operating system comprising an audio watermark encoding
2 system as recited in claim 5.

3
4 11. **(PREVIOUSLY TWICE AMENDED)** A watermark insertion
5 unit, comprising:

6 an input to receive frequency magnitude components of an audio signal,
7 hearing thresholds derived from the magnitude components, strong watermark
8 values, and weak watermark values; and

9 multiple insertion operators for selectively combining the magnitude
10 components and one of either the strong watermark values or the weak watermark
11 values depending upon whether the magnitude components exceed or fall below
12 the hearing thresholds.

13
14 12. **(TWICE AMENDED)** An audio watermark detection system,
15 comprising:

16 an input module configured to receive a watermarked audio signal;

17 a synchronization module configured to determine which portion of the
18 watermarked audio signal might contain a watermark; and

19 a correlation module configured to detect whether a watermark is present in
20 the portion of the watermarked audio signal that the synchronization module
21 determines might contain a watermark and, if a watermark is detected, further
22 configured to determine whether that watermark is either a strong watermark or a
23 weak watermark.

1 **13. (AMENDED)** An audio watermark detection system as
2 recited in claim 12, wherein the correlation module is further configured to
3 compute a correlation value from the watermarked audio signal and the strong
4 watermark that tends toward a first value when the strong watermark is present
5 and a second value when the strong watermark is not present.

6
7 **14. (AMENDED)** An audio watermark detection system as recited
8 in claim 12, wherein the correlation module is further configured to compute a
9 correlation value from the watermarked audio signal and the weak watermark that
10 tends toward a first value when the weak watermark is present and a second value
11 when the weak watermark is not present.

12
13 **15. (TWICE AMENDED)** An audio watermark detection system as
14 recited in claim 12, wherein the correlation module is further configured to
15 compute a correlation value from the watermarked audio signal and one of either
16 the strong watermark or the weak watermark, the correlation module determining
17 that said one strong watermark or weak watermark is present when the correlation
18 value exceeds a predetermined threshold plus a random amount.

19
20 **16.** An operating system comprising an audio watermark detection
21 system as recited in claim 12.
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23
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1 17. (AMENDED) An audio watermark detection system
2 comprising:

3 a pattern generator configured to generate both a strong watermark and a
4 weak watermark; and

5 a watermark detector configured to detect whether a watermark is present in
6 a portion of the watermarked audio signal and, if a watermark is detected, further
7 configured to determine whether that watermark is either a strong or a weak
8 watermark.

9
10 18. (AMENDED) An audio watermark detection system as recited
11 in claim 17, wherein the watermark detector is further configured to compute
12 correlation values from the watermarked audio signal and each of the strong
13 watermark and the weak watermark and to determine whether that watermark is
14 either the strong watermark or the weak watermark based on whether the
15 correlation values exceed a predetermined threshold.

16
17 19. (AMENDED) An audio watermark detection system as recited
18 in claim 17, further comprising:

19 a random operator for generating a random value; and

20 the watermark detector being further configured to compute correlation
21 values from the watermarked audio signal and each of the strong watermark and
22 the weak watermark and to determine whether that watermark is either the strong
23 watermark or the weak watermark based on whether the correlation values exceed
24 a predetermined threshold plus the random value.
25

1 **20. (AMENDED)** An audio decoding system comprising:
2 an audio watermark detection system as recited in claim 17;
3 a converter configured to convert a watermarked audio signal into
4 magnitude and phase components;
5 a mask processor configured to determine a hearing threshold for
6 corresponding magnitude components; and
7 a decompression unit, wherein the decompression unit and the audio
8 watermark detection system both utilize the magnitude components.

9
10 **21.** An operating system comprising an audio watermark detection
11 system as recited in claim 17.

12
13 **22. (THRICE AMENDED)** An audio watermarking architecture,
14 comprising:

15 a watermark encoding system configured to selectively insert either a
16 strong watermark or a weak watermark into segments of an audio signal, so that
17 resulting segments have either the strong or the weak watermark inserted therein,
18 but not both; and

19 a watermark detecting system configured to detect a presence of a
20 watermark in the segments of the audio signal and, if a watermark is present,
21 further configured to determine whether the present watermark is either the strong
22 watermark or the weak watermark.
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1 **23.** An audio watermarking architecture as recited in claim 22, wherein
2 the watermark encoding system resides at a content producer to watermark
3 original audio content and the watermark detecting system resides at one or more
4 clients to detect the watermarks and play the original audio content.

5
6 **24. (TWICE AMENDED)** An audio watermarking architecture
7 comprising:

8 a watermark encoding system configured to selectively insert either a
9 strong watermark or a weak watermark into segments of an audio signal; and

10 a watermark detecting system configured to detect a presence of either the
11 strong watermark or the weak watermark in the segments of the audio signal

12 wherein the watermark encoding system comprises:

13 a converter configured to convert the audio signal into magnitude
14 and phase components;

15 a mask processor configured to determine a hearing threshold for
16 corresponding magnitude components;

17 a pattern generator configured to generate both the strong watermark
18 and the weak watermark; and

19 a watermark configured insertion unit to selectively insert one of
20 either the strong watermark or the weak watermark into the audio signal
21 based on whether the magnitude components exceed or fall below the
22 hearing threshold.

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1 **25. (AMENDED)** An audio watermarking architecture as recited
2 in claim 22, wherein the watermark detecting system comprises:

3 a converter configured to convert a watermarked audio signal into
4 magnitude and phase components;

5 a mask processor configured to determine a hearing threshold for
6 corresponding magnitude components;

7 a pattern generator configured to generate both a strong watermark and a
8 weak watermark; and

9 a watermark detector configured to detect whether a watermark is present in
10 a portion of the watermarked audio signal and, if a watermark is detected, further
11 configured to determine whether that watermark is either the strong or the weak
12 watermark.

13
14 **26. (PREVIOUSLY TWICE AMENDED)** A method for
15 watermarking an audio signal, comprising:

16 watermarking a first portion of the audio signal with a strong watermark;
17 and

18 watermarking a second portion of the audio signal with a weak watermark,
19 wherein the first and second portions are separate.

20
21 **27.** A method for watermarking an audio signal, comprising:
22 comparing samples of the audio signal to a hearing threshold;
23 watermarking samples exceeding the hearing threshold with a strong
24 watermark; and
25

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1 watermarking samples falling below the hearing threshold with a weak
2 watermark.

3
4 **28.** A method as recited in claim 27, wherein the watermarking samples
5 comprises:

6 watermarking samples exceeding the hearing threshold plus a buffer value
7 with a strong watermark;

8 watermarking samples falling below the hearing threshold by less than the
9 buffer value with a weak watermark; and

10 leaving samples lying within the buffer value above and below the hearing
11 threshold without a watermark.

12
13 **29.** A method as recited in claim 27, further comprising detecting the
14 strong watermark and the weak watermark in the audio signal.

15
16 **30.** A method as recited in claim 29, wherein the detecting comprises
17 computing a correlation value from the audio signal and the strong watermark, the
18 correlation value tending toward a first value when the strong watermark is present
19 and a second value when the strong watermark is not present.

20
21 **31.** A method as recited in claim 29, wherein the detecting comprises
22 computing a correlation value from the audio signal and the weak watermark, the
23 correlation value tending toward a first value when the weak watermark is present
24 and a second value when the weak watermark is not present.
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1 32. A method as recited in claim 27, further comprising:
2 computing a correlation value from the audio signal and one of the strong
3 watermark or the weak watermark; and
4 determining that said one strong watermark or weak watermark is present
5 when the correlation value exceeds a predetermined threshold plus a random
6 amount.

7
8 33. **(THRICE AMENDED)** A method comprising:
9 selectively encoding portions of an audio signal with either a strong
10 watermark or a weak watermark, so that resulting portions have either the strong
11 or the weak watermark encoded therein, but not both; and
12 detecting a presence of a watermark in the portions of the audio signal;
13 if a watermark is present, determining whether the present watermark is
14 either the strong watermark or the weak watermark.

15
16 34. **(PREVIOUSLY TWICE AMENDED)** A computer readable
17 medium having computer executable instructions for:
18 watermarking a first portion of an audio signal with a strong watermark;
19 and
20 watermarking a second portion of the audio signal with a weak watermark,
21 wherein the first and second portions are separate.
22
23
24
25

1 **35.** A computer readable medium having computer executable
2 instructions for:

3 comparing samples of an audio signal to a hearing threshold;
4 watermarking samples exceeding the hearing threshold with a strong
5 watermark; and
6 watermarking samples falling below the hearing threshold with a weak
7 watermark.

8
9 **36. (TWICE AMENDED)** An audio watermarking system comprising:
10 a pattern generator to generate both a strong watermark and a weak
11 watermark; and

12 a watermark insertion unit to insert the strong watermark and the weak
13 watermark into the audio signal,

14 wherein the watermark insertion unit selectively inserts either the strong
15 watermark or the weak watermark into segments of the signal according to an
16 audible measure of the segments.

17
18 **37. (AMENDED)** An audio watermarking system comprising
19 a pattern generator configured to generate both a strong watermark and a
20 weak watermark; and

21 a watermark insertion unit configured to insert the strong watermark into
22 one or more first segments of the audio signal and to insert the weak watermark
23 into one or more second segments of the audio signal, wherein the first and second
24 segments are separate.
25

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1 **38.** An audio watermarking system as recited in claim 37, wherein the
2 watermark insertion unit selectively chooses segments for insertion of the
3 watermarks according to an audible measure of the segments.

4
5 **39.** An audio watermarking system as recited in claim 37, wherein the
6 watermark insertion unit selectively chooses segments for insertion of the strong
7 watermark according to an audible measure of the segments.

8
9 **40. (AMENDED)** An audio watermarking system comprising:
10 a pattern generator configured to generate both a strong watermark and a
11 weak watermark; and

12 a watermark insertion unit configured to insert the strong watermark into
13 one or more first segments of the audio signal and to insert the weak watermark
14 into one or more second segments of the audio signal, wherein the first and second
15 segments are separate, wherein the watermark insertion unit selectively chooses
16 segments for insertion of the weak watermark according to an audible measure of
17 the segments.

18
19 **41. (TWICE AMENDED)** An audio watermarking system comprising:
20 a pattern generator configured to generate both a strong watermark and a
21 weak watermark; and

22 a watermark insertion unit configured to insert the strong watermark into
23 one or more first segments of the audio signal and to insert the weak watermark
24 into one or more second segments of the audio signal, wherein the first and second
25 segments are separate;

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1 a processor configured to determine a hearing threshold for segments of the
2 audio signal; and

3 the watermark insertion unit being further configured to insert the strong
4 watermark into a segment when the signal of that segment exceeds the hearing
5 threshold and inserts the weak watermark into a segment when the signal of that
6 segment falls below the hearing threshold.

7
8 **42.** An operating system comprising an audio watermarking system as
9 recited in claim 37.

10
11 **43.** A method as recited in claim 27, further comprising:
12 computing a correlation value from the audio signal and one of either the
13 strong watermark or the weak watermark; and
14 determining that either said one strong watermark or said one weak
15 watermark is present when the correlation value exceeds a predetermined
16 threshold plus a random amount.

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